

# A New Species of *Boeckella* (Copepoda: Calanoida) from Western Australia, and Comments on Two Other Congeners

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## Abstract

*Boeckella shieli* sp. nov. is described from a temporary freshwater pool near Esperance. It has a pseudochelate extremity on the exopod of the male fifth right leg as in *B. pseudochelae* Searle and *B. geniculata* Bayly.

The probable synanthropic introduction of *B. fluvialis* Henry into Western Australia from New South Wales or Victoria is discussed.

An aberrant male of *B. triarticulata* (Thomson) with several intersexual features in the fifth pair of legs is described and discussed.

## Introduction

The genus *Boeckella*, which is very common in Australian fresh waters, was revised by Bayly (1964). When further reviewed by Bayly (1979) the genus was considered to contain 19 valid species of which six occurred in Western Australia. Subsequent collections from this State have yielded a further new species which is described below. Additionally, another species, hitherto thought to be restricted to eastern Australia, has now been discovered within the Perth metropolitan region, apparently as a result of accidental anthropic introduction. With this apparently introduced species, which is discussed below, the total number of species of *Boeckella* now known from Western Australia rises to eight.

## Systematics

### *Boeckella shieli* sp. nov.

Figures 1A-1F

#### Holotype

Western Australian Museum (WAM) 89-84; ♂ dissected and mounted on microslide; from roadside pool 60 km N.N.E. of Esperance near Truslove (33°21'S, 121°43'E); 6 October, 1981; coll. R.J. Shiel and M.A. Brock.

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### Allotype

WAM 90-84; ♀ dissected and mounted on microslide; collection data as for holotype.

### Paratypes

WAM 91-84, 1 ♂ on slide; WAM 92-84, 1 ♀ on slide; WAM 93-84, 18 ♂♂ unmounted in formalin in vial; WAM 94-84, 35 ♀♀ unmounted in formalin in vial; collection data as for holotype.

### Diagnosis

This species resembles *B. pseudochelae* and *B. geniculata* in the pseudochelelate extremity of the male fifth right exopod. It is easily distinguished from the latter in lacking the marked inner expansion on the distal segment of the male fifth right protopod, and also in lacking terminal setae on the male fifth right endopod. *B. shieli* sp. nov. is also easily separated from *B. pseudochelae* in having a much shorter fifth right endopod in the male.

The structure of the male fifth right endopod of *B. shieli* sp. nov. closely resembles that described for *B. propinqua longisetosa* Smith by Bayly (1964, p. 208, figures 10G and H), but this form lacks a pseudochelelate fifth right exopod and is otherwise quite different.

### Description of male

Size: Mean ( $n = 14$ ) length to end of longest uropodal setae, and to end of uropods (formerly furcal rami), 1.55 mm (range 1.46-1.67 mm) and 1.29 mm (range 1.14-1.44 mm) respectively.

Fifth legs (Figures 1A-1D): Right terminal exopod segment (= right claw) pseudochelelate at extremity as in *B. pseudochelae* Searle and *B. geniculata* Bayly, extending to distal extremity of middle segment of left exopod (= basal segment of left claw); right endopod 3-segmented with large proximal segment but minute middle and distal segments, middle segment triangular (lacking free outer edge) and axis of ramus bent outwards beyond proximal segment (closely similar to condition in corresponding endopod of *B. propinqua longisetosa* Smith), extending 0.5 times distance along inner edge of right middle exopod segment; left exopod typical of genus; left endopod 1-segmented extending ca 0.3 times distance along inner edge of left proximal exopod segment; right distal protopod segment sometimes with tooth (single or 2-pronged) on inner edge slightly distal to half-way point.

### Description of female

Body and clutch size: Mean ( $n = 20$ ) length to end of longest uropodal setae, to end of uropods, and of prosome only (measured mid-dorsally so as to exclude large 'wings' of last prosomal segment), 1.80 mm (range 1.69-1.86 mm), 1.60 mm (range 1.49-1.67 mm) and 1.20 mm (range 1.11-1.24 mm) respectively. Mean ( $n = 10$ ) clutch size 21.3 eggs (range 13-27 eggs).

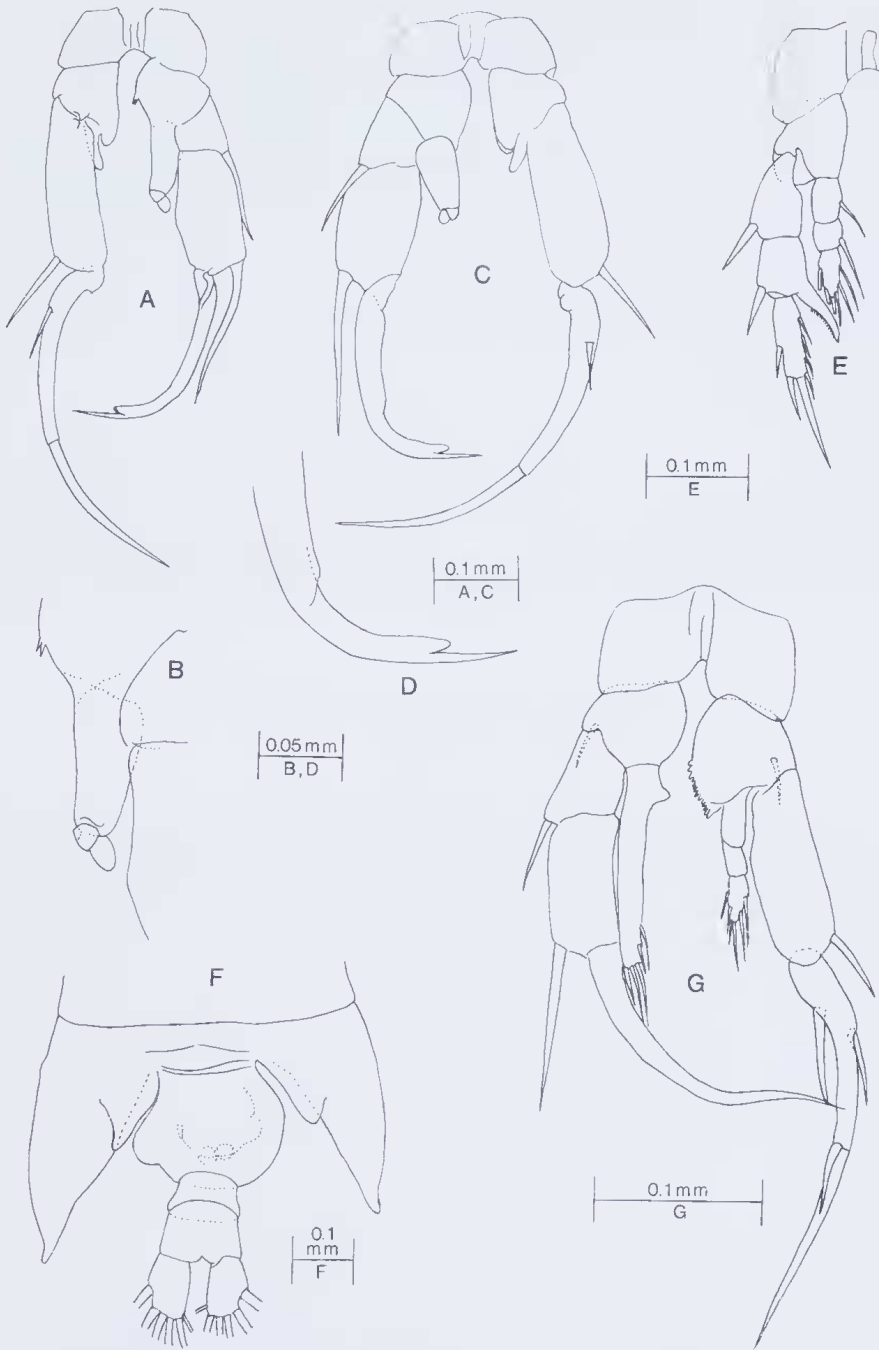


Figure 1 A-F, *Boeckella shieli* sp. nov.; G, *B. triarticulata* (Thomson) aberrant male with intersexual features. A, ♂ fifth legs, posterior aspect; B, details of right endopod of A; C, ♂ fifth legs, anterior aspect; D, details of extremity of right exopod of C; E, ♀ fifth leg; F, last prosomal segment and urosome of ♀, dorsal aspect. G, ♂ fifth legs, anterior aspect.

Fifth legs (Figure 1E): Terminal segment of exopods typical of Australian representative of genus, with 7 spines (cf. *B. minuta* and *B. opaqua*); endopods 3-segmented.

Last prosomal and genital segments (Figure 1F): Last prosomal segment produced posteriorly on each side into large 'wing', that on left larger and extending backwards to reach slightly beyond posterior edge of urosome segment 3, right 'wing' reaching to posterior edge of urosome segment 2; genital segment (= urosome segment 1) laterally expanded, maximum width *ca* 2.5 times mean width of urosome segment 2, smoothly rounded on right but with blunt out-growth projecting on left.

### Remarks

It is noteworthy that all three 'pseudochelate' species of *Boeckella* occur in shallow temporary bodies of water. Two of these, *B. geniculata* and *B. shieli* sp. nov., occur in Western Australia.

*B. shieli* sp. nov. coexisted with *Calamoecia ampulla* (Searle) at the sole locality from which it is known.

### *Boeckella fluvialis* Henry, 1922

### Remarks

This species was treated by Bayly (1964, pp. 219 and 234; 1979, p. 125) and Bayly and Williams (1973, figure 6:2) as being restricted to three eastern States: Queensland, New South Wales and Victoria. In October 1978 I was asked by Mr J.R. Terni to confirm his identification of *B. fluvialis* from the ponds specified below. Examination of specimens proved the accuracy of his determination.

At my request Mr Terni investigated further the history of these ponds and supplied the following information (J.R. Terni, pers. comm., 9 February, 1979). Before the Council built on this land it was owned by a nursery-man, Mr B. Wilson, who used the property from 1935-1960. During this time seedlings especially stone fruits and berry fruits were imported from Banksdale in Victoria, and Kenthurst (ca 30 km N.W. of Sydney) in New South Wales. Some of these seedlings were planted out in rows with the soil from the pots also being added to the ground. At this time much of this land was swampy during winter, being situated only about 50 m from the Canning River. The Canning Town Council bought the land in 1962 and built four ponds on it in about 1970 (*B. fluvialis* is known from two of these ponds). The depth of the ponds does not exceed 1 m.

No population of *B. fluvialis* is known in Western Australia outside the Canning Town Council Office ponds. Mr Terni commented (pers. comm., 17 June, 1984), 'Over the past few years I have made many collections from all sorts of water

bodies in the metropolitan area around Perth, also I have been to a number of closer country locations, but I have only collected *B. fluvialis* from the Canning Town Office ponds'. Although the evidence is only circumstantial (and must remain so), I consider it highly likely that the Cannington populations developed from resting eggs that were introduced into Western Australia in soil imported from New South Wales or Victoria or both. This synanthropic introduction is highly noteworthy, but not without parallel in terms of distance of transport. It seems likely that three species of freshwater calanoid have been introduced to New Zealand from Australia in recent times. These are *B. minuta*, which is known only from man-made impoundments in the North Island of New Zealand, *B. symmetrica* of which only one population near Auckland is known, and *Calamoecia ampulla* of which only one population in the South Island is known.

#### Material Examined

Western Australia: Canning Town Council Office ponds, Cannington, greater Perth, several specimens of both sexes, coll. J.R. Terni, 11 September, 1978. (The species has been collected from these ponds on four different occasions subsequent to September 1978.)

### An Intersex in *Boeckella triarticulata* (Thomson, 1883)

#### Figure 1G

#### Description of Aberrant Male with Intersexual Fifth Legs

The individual whose fifth legs are illustrated in Figure 1G was fundamentally male, but showed several intersexual characteristics as follows.

Right exopod fully male; right endopod intersexual, basic shape that of male, but with terminal and sub-terminal setae as in female. Left distal protopod segment male with toothed plate along inner distal edge (cf. Bayly 1964, figures 5A-5L). Left exopod essentially male in overall shape but with two large supernumerary spines on inner edge of distal claw, one from each of exopod segments two (middle) and three (distal); left endopod almost fully female, three-segmented (instead of two-segmented as in male) and terminal segment with typical female armature of six setae.

#### Remarks

The proximal member of the two supernumerary spines on the inner edge of the left claw may be a female feature, possibly representing the equivalent of the inner process from the middle segment of the female exopod. The distal member of the two supernumerary spines almost certainly represents the developmental homologue of the inner distal spine on the terminal segment of the exopod when it was at the two-segmented, fifth copepodite stage (see Bayly 1964, figures 9N and 9O). This particular fifth copepodite spine typically disappears when the fifth copepodite stage is transformed into the adult, but under conditions of



parasitic castration may be retained (see Bayly 1963, figures 3-8; 1964, p. 183). A non-intersexual teratological specimen of *B. triarticulata* resulting from this particular developmental anomaly was described by Bayly (1964, pp. 183-184, figure 5ZZ).

The appendage described above is the only intersexual one found amongst the more than two thousand male fifth legs of *B. triarticulata* that I have examined.

#### Material Examined

Queensland: Eyre Creek crossing near Glengyle H.S. (24°47'S, 139°35'E), 1 aberrant ♂, coll. J. Forrest, 18 September, 1977.

### Acknowledgements

I wish to thank Drs M.A. Brock and R.J. Shiel for collecting the new species during a survey which was supported by Murdoch University. Initially Dr Shiel sent me a specimen of the new species which he had dissected and mounted on a microslide. I also thank Mr J.R. Terni, Western Australian Institute of Technology, for sending material of *B. fluvialis*, and for researching the history of the Canning Town Office ponds.

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